

Appln No. 10/506,294

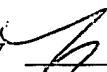
Supp Prel Amdt date February 10, 2005

REMARKS/ARGUMENTS

Claims 1-26 remain pending in this application. Claims 1-18 have been amended to place them in better form for U.S. practice. Claims 19-26 are newly added claims. It is respectfully requested that the foregoing supplemental preliminary amendment be entered prior to examination.

Due to the number of amendments, a substitute specification pursuant to 37 CFR § 1.125 and MPEP § 608.01 (q) is submitted herewith to facilitate the prosecution of this application. The substitute specification is accompanied by a marked up copy showing the changes between the original application, as filed, and the substitute specification. The substitute specification does not contain any new matter and includes the same changes as are indicated in the marked up copy. Applicant respectfully requests that the substitute specification be entered in this case.

Respectfully submitted,  
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## APPLICATOR HEAD FOR AN APPLICATOR DEVICE

## 5 CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a National Phase Patent Application of International Application Number PCT/EP03/02033, filed on February 27, 2003, which claims priority of German Patent Application Number 202 03 307.4, filed on March 1, 2002.

10 FIELD OF THE INVENTION

The present invention concerns an applicator head for applying individual flat material elements, in particular labels, to objects, ~~as set forth in the classifying portion of claim 1.~~

BACKGROUND

15       Applicator devices serve to apply or mount flat material elements, in particular labels, to an object. In the case of applicator devices of that nature, it is important that the applicator head holds the flat material element to be applied securely during the application procedure, ~~in particular in regard to.~~ This is particularly important to avoid displacement of the applicator head from a starting position, in which it picks up the flat material element to be applied, to the application location ~~at, in~~ which the flat material element is applied to the object. ~~For that purpose~~ In some conventional applicator devices ~~are known in practice, in which,~~ a suction air flow is used for holding the flat material element to the applicator head. Two different kinds of suction air applicator devices ~~are to be found in the state of the art~~ common in these conventional devices.

25       The first type of suction air applicator device includes a fan ~~which that~~ produces a suction air flow. ~~For that purpose the~~ The fan is disposed in the interior of the housing portion of the applicator device, which also accommodates ~~thea~~ control system and ~~thea~~ hydraulic or pneumatic displacement means of the applicator device. The applicator head has openings therethrough in its applicator surface. The flat material element is held to the applicator head by  
30       the suction air produced by the fan.

~~That~~This first type of suction air applicator device ~~has been found to suffer from the~~  
disadvantage ~~that it, however,~~ does not operate in a fault-free manner when dealing with flat  
material elements ~~which that~~ are small and/or difficult to apply. In addition ~~that, this type of~~  
applicator device requires secondary air.

5       ~~Besides the fan type applicator device, so-called injector applicator devices are known as~~  
~~a further~~A second type of suction air applicator device. ~~The is an injector applicator device.~~  
Injector applicator devices operate on the basis of the venturi principle. ~~For that purpose the~~ The  
applicator head is again provided with a plurality of openings therethrough, wherein an injector  
is disposed in the interior of the housing of the applicator device, and compressed air ~~being is~~  
10       jetted into the injector. ~~That~~This causes the air to be dragged out of the applicator head, thereby  
reducing air pressure in the head, so that the flat material element is held to the applicator head  
~~as a consequence of the reduced pressure produced in that way.~~

~~That~~ The second type of injector applicator device ~~has been found to suffer~~suffers from  
the disadvantage that fault-free operation is only possible when all openings in the applicator  
15       head are covered by the flat material element. ~~It follows therefrom that a~~ A suitable applicator  
head, therefore, has to be produced for each form of a flat material element, which is  
disproportionately costly.

## OBJECT

20       The object of the present invention is to provide an applicator head which, in a simple  
manner, permits adaptation of the applicator surface of the applicator head to flat material  
elements of different kinds of shape and/or size.

~~In regard to the applicator head the foregoing object is attained by the features of claim 1.~~  
~~Advantageous configurations in that respect are set forth in following claims 2 through 18.~~

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## SUMMARY

By virtue of the possibility of ~~being able to perforate~~perforating one or both of at least two  
~~material~~-weak locations of a material provided on the applicator surface in order to provide one  
or ~~two~~more suction openings, the applicator surface can be readily adapted to differing shapes

and/or varying sizes of the flat material elements. ~~That applies in particular when the applicator surface has a plurality of material~~ The weak locations. They are preferably arranged regularly on the applicator surface so that applicator heads for flat material elements of different shapes and/or varying sizes can be provided by perforating the desired ~~material~~ weak locations in the same applicator surface.

~~With one and the same applicator surface, it~~ It is also possible to provide different applicator heads with a single applicator surface in a particularly simple manner if the ~~material~~ weak locations in the material are arranged regularly, preferably in a raster grid configuration, that is to say distributed over the entire applicator surface, preferably in columns and rows.

If the applicator surface is produced from a plastic material, in particular polyethylene, static charges can occur upon detachment of the flat material element from the applicator surface. Those static charges in turn impede pushing a fresh flat material element on to the applicator surface. In addition, it is difficult when using a plastic material, in particular a PE-material, to produce the applicator surface with a material thickness which is regular throughout. In order to permit the latter and/or to avoid static charging of the applicator surface, it is further advantageous if ~~at its~~ the outside of the applicator surface is provided with grooves which preferably extend in mutually parallel relationship at an equidistant spacing. ~~It has proven~~ is also advantageous ~~in that respect~~ if the grooves are provided between two columns of ~~material~~ weak locations in the material.

~~In order not to have to replace~~ To avoid replacement of the complete applicator head each time ~~when dealing with a~~ different shape and/or size of flat material elements is to be processed ~~of differing shape and/or size, it can further be provided that,~~ the applicator surface ~~is~~ can be provided on an applicator pad which is replaceably joined to the applicator head.

~~If the~~ The applicator head ~~for applying a flat material element is~~ may be reversibly displaceable in a straight line ~~reversibly~~ from a starting position in which it receives, for example, the flat material element into an applicator position in which it applies the flat material element to an object. In this case, it is advantageous if the applicator head has a pad receiving means into which the applicator pad can be reversibly inserted ~~transversely with respect in a~~ direction transverse to the direction of displacement of the applicator head.

The pad receiving means can be ~~of quite~~configured in several different configurations. Thus, ~~there is the possibility that it is~~ways. It may, for example, be formed by two C-shaped guide rails ~~which that~~ extend in parallel relationship to each other and into which the applicator pad can be reversibly inserted.

5 In order to achieve a clearly defined end position when inserting the applicator pad into the pad receiving means, ~~there can further an~~abutment may be provided ~~an abutment~~ on the pad receiving means, ~~that and which~~ defines said an end position.

~~So that~~To prevent the applicator pad ~~does not come from coming~~ loose from its end position during the applicator process, ~~it can further be provided that the applicator pad is~~may be  
10 releasably locked on the applicator head by a locking device. In that case, the locking device can be formed by a spring-loaded ball, which is provided on the applicator head or the applicator pad, and which is capable of reversibly engaging into a recess on the applicator pad or the applicator head.

A particularly simple structure can be achieved if the abutment is formed by the locking  
15 device.

The applicator pad itself can, in turn, be ~~made up~~constructed from ~~quite a~~a variety of different elements. Thus, ~~there is the possibility that~~For example, the applicator pad ~~is~~may be formed from a carrier plate and an applicator plate including the applicator surface, the plates preferably forming at least one hollow space between them. In that case, the carrier plate can be  
20 made from aluminum ~~whereas and~~ the applicator plate is ~~preferably~~can be made from a deformable material, in particular a plastic material, ~~preferably~~ such as PE or polyethylene.

The ~~material~~ weak locations of the material can, in turn, be formed by ~~different a~~a variety of solutions and/or elements. In one embodiment, the ~~material~~ weak locations can be ~~afforded by~~ recesses or depressions in the applicator plate. In that case ~~then~~, the remaining material, that is to  
25 say the bottom of the depression, ~~is to~~can be perforated by means of a suitable tool. In that case, the ~~material~~ component portions of the material ~~which that~~ are displaced in the perforating operation would project ~~outwardly beyond from~~ the applicator plate. Therefore it has proven to be advantageous if, at each ~~material~~ weak location at the applicator surface, preferably a depression in the applicator plate, at the other side or surface of the applicator plate ~~which that~~ extends in

parallel relationship with the applicator surface, there are provided corresponding material weak locations, preferably recesses, which are aligned with the material weak locations at the applicator surface and which are preferably separated from each other by a 'membrane', that is to say a thin material skin portion. In other words, the thin material skin portion is disposed within the applicator plate so that, in the perforation operation, component portions of the thin material skin portion do not project beyond the applicator plate.

As ~~has already been discussed hereinbefore~~noted above, static charges can occur at the applicator surface, which make it difficult to fit a fresh flat material element thereon, ~~or which make it difficult to detach a flat material element which~~that is already disposed on the applicator surface. Grooves can be provided in the applicator surface to prevent ~~that~~this from happening. Alternatively, ~~or in addition it can also be provided that~~, the applicator plate ~~which has the~~may have an applicator surface that is of a thickness, measured substantially perpendicularly to the applicator surface, ~~which permits to permit~~ material removal. Such material can be removed to form a defined applicator surface whichthat is adapted to a specific flat material element. ~~That~~ Material removal can be effected, for example, by a milling operation in a plane parallel to the applicator surface. ~~That provides that the~~ The applicator surface area iscan thus be reduced in relation to the area of the total applicator plate ~~and is at least~~. The applicator surface area can thus be approximately ~~precisely~~ matched to the shape of the flat material element so that the latter does not have to be pushed over a surface region of the applicator plate or applicator surface, which region is not occupied by the flat material element by virtue of the configuration thereof, ~~whereby the~~. The problem of static charging is furthercan thereby be reduced.

The applicator plate and the carrier plate can be connected to each other both releasably and ~~also non-releasably~~. ~~In the case of a~~ A non-releasable connection, ~~that can be achieved by means of an adhesive connection of the carrier plate to the applicator plate~~. ~~Equally~~ Alternatively, the applicator plate and the carrier plate can be connected together by a screw connection. In the latter case, care is to be taken to ensure that the ~~join~~joining area between the applicator plate and the carrier plate is ~~at least air-tightly closed off~~tight.

~~In order to be able to~~To make a communication between the applicator pad and the suction air source, the carrier plate ~~is~~may be provided with a coupling for releasable communication with

the suction air source. In that case, the coupling can be formed by a preferably circular opening in the carrier plate which, when the applicator pad is mounted to the applicator head, is connected to a tube portion.

Further advantageous configurations and ~~an embodiment~~ embodiments of the invention by way of example ~~of the invention~~ are described hereinafter with reference to the accompanying drawings. ~~In that respect it is to be noted that the terms 'left', 'right', 'down' and 'up' used in this respect relate to the drawings with the references in the normally readable position. In the drawings:~~

## 10 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a diagrammatic perspective view of ~~an~~ one embodiment of ~~the~~ an applicator head according to the invention, together with a tool for perforating ~~material~~ weak locations in an applicator surface of the head.

Figure 2 shows a side view of the applicator head illustrated in Figure 1 with the perforating tool.

Figure 3 shows a plan view of the applicator surface of the applicator head shown in Figure 1.

Figure 4 shows a cross-sectional view ~~in section taken~~ along line IV-IV in Figure 3.

Figure 5 shows the detail E in Figure 4 on an enlarged scale, and.

Figure 6 shows a perspective view of a second embodiment of an applicator plate which can be received in the applicator head shown in Figure 1.

## DETAILED DESCRIPTION OF THE INVENTION

~~The embodiment shown in Figure 1 in the form of an exploded view for~~ According to a first embodiment of the invention shown in Fig. 1, an applicator head 10 according to the invention has a mounting frame 20 for ~~preferably~~ releasably mounting the applicator head 10 to a housing portion of an applicator device (not ~~further shown herein~~), in which is arranged a suction air source (not shown), for example in the form of an injector, and an applicator pad 40 which

can be reversibly pushed on to the mounting frame 20 in a manner described in further detail hereinafterbelow.

The mounting frame 20 ~~in this embodiment is of~~ has a basically square basic shape and is made up of a square base plate 22 and ~~an also a~~ square frame element 24. As can be seen in particular from Figure 44, the base plate 22 is provided with ~~through~~ openings 22a through which the air flow produced by the suction air source can flow from the applicator pad 40 through the mounting frame 20 to the suction air source.

~~At~~On the side of the base plate 22 facing away from the frame element 24 ~~the base plate 22 has~~ are fixing bars 22b, by means of which the mounting frame 20 ~~formed by the base plate 22 and the frame element 24,~~ and the applicator pad 4040, which ~~is possibly pushed on to the mounting frame 20,~~ can preferably be releasably mounted to the applicator device (see Figures 2 and 4). The applicator pad 40 can be pushed onto the mounting frame 20. The fixing bars 22b can be formed, for example, by disengaging portions of the base plate 22 and bending them over through about 90°. Removal of the portions of the base plate 22, which necessarily have to be removed from the surface of the plate ~~to produce~~produces the through openings 22a.

The square area ~~which~~that is defined by the frame element 24 approximately corresponds to the area of the base plate 22, so that the peripheral wall 24a of the frame element 24, which wall forms the frame, delimits the base plate 22 at ~~the its~~ its edges ~~thereof~~. As can be seen in particular from ~~Figures 2 and 4,~~Figure 4a, the peripheral frame wall 24a has two wall portions, a first wall portion 24aa and a second wall portion 24ab. The first wall portion 24aa, which faces towards the base plate 22, defines a square area ~~which~~that is somewhat smaller than the base plate 22 ~~whereas the 22~~. The second frame portion 24ab, ~~which adjoins same~~ the first wall portion 24aa and ~~which~~ faces away from the base plate 22. The second frame portion 24ab encompasses a square area whichthat is larger than the base plate 22. The two wall portions 24aa and 24ab are integrally connected together by way of a step.

On its side facing towards the base plate 22, the frame element 24 is provided with inwardly directed connecting bars or connecting flanges 24b, by means of which the frame element 24 is preferably non-releasably secured to the base plate 22, for example by adhesive, soldering or riveting ~~(see Figure 4)~~.



As can further be seen from Figure 1, the frame element 24 has in its interior a plurality of stiffening ribs 24c, which serve, inter alia, ~~for maintaining~~ to maintain the stability in respect of shape of the frame element 24. ~~In addition,~~ As shown in Figure 4, at the edges, facing away from the base plate ~~22,22~~ of two mutually parallel wall sides, the frame element 24 ~~has~~ can also  
 5 be provided with guide elements 24d, which form a pad receiving means for the applicator pad 40 and into which the applicator pad 40 can be inserted. The guide elements 24d are each formed by a respective C-shaped projection 24d, which extends over the full length of the corresponding frame wall and ~~which~~ faces into the interior of the frame element 24. If the applicator head 10 is not of a square shape but, for example, a rectangular shape, then the guide elements 24d  
 10 preferably extend at the edges of the peripheral frame ~~wall~~ walls 24a, ~~which~~ that form the long sides of the rectangle.

~~In connection with the mounting frame 20 it should also be noted that the~~ The base plate 22 and the frame element 24 can be produced from the same or different materials. It is preferable for the mounting frame to be produced throughout from aluminum or an alloy thereof.

15 The applicator pad 40 includes a carrier plate ~~42~~ 242, which is preferably produced from aluminum or an alloy thereof, and an applicator plate ~~44~~ 444, which is preferably made from an easily deformable or severable material, in particular a plastic material, preferably polyethylene. The carrier plate 42 and the applicator plate 44 are preferably non-releasably connected together, for example by adhesive.

20 The carrier plate 42 is also ~~of a substantially square area extent which~~ and has an area that is congruent with that of the area of the base plate 22. ~~As a consequence of~~ If the width or length, ~~which is greater than the base plate 22 and thus the carrier plate 42, of the square of the~~ area enclosed by the second wall portion 24ab is greater than the base plate 22 and the carrier  
 25 plate 42, the spacing of the two guide projections 24d and in particular the spacing between the base limbs of the guide projections 24d, ~~which~~ that connect ~~together~~ the two free limbs of each C-shaped projection 24d, ~~corresponds together~~ can correspond to the width and length ~~respectively~~ of the carrier plate 42. ~~In addition~~ some embodiments, the spacing of the two free limbs of each C-shaped projection 24d approximately corresponds to the thickness of the carrier plate 42, or is slightly larger. As a result, the carrier plate 42 of the applicator pad 40 can be inserted into the

mounting frame 20 along the guide projections 24d and ~~is~~be securely held there.

~~In order to be able to move~~To facilitate moving the applicator pad 40 into a ~~position~~specific position which is defined with respect to the mounting frame 20, upon inserting it into specific position relative to the mounting frame 20, the carrier plate 42 is provided with an abutment 42a (Figures 1-4) at its edge ~~which that~~ faces in opposite relationship to the insertion direction. The abutment 42a in this embodiment is formed by a bent edge portion of the carrier plate 42, which, in the assembled condition, faces ~~in~~ the direction of the mounting frame 20 and ~~which~~ preferably extends over the full length of that edge. ~~When the end position is reached during the~~the bent edge. The insertion movement which takes place in a direction in perpendicular relationship to the surface normal to the applicator plate 44, that is to say, in parallel relationship with the applicator plate 44. When the specific, end position is reached, the abutment 42a bears against the wall portion 24ab of the frame wall 24a and thus delimits the insertion movement.

~~At~~As shown in Figure 4, the carrier plate 42 has stiffening ribs 42b at its side facing towards the mounting frame 20 the carrier plate 42 has20. The stiffening ribs 42b ~~which~~ promote the shape stability ~~in respect of shape of the carrier plate 42. Finally the~~ The carrier plate 42 is also provided with at least one through opening (not shown) through which the air flow produced by the suction air source can flow from the applicator plate 44 to the suction air source.

The applicator plate 44 is ~~in turn of a square~~ basic square shape, the area dimensions of which ~~however~~ are smaller than those of the carrier plate 42 so that edges of the carrier plate 42 remain free, ~~by means of which and~~ the carrier plate 42 can be inserted into the guide projections 24d. In addition, on its side facing towards the carrier plate 42, the applicator plate 44 has an edge flange or rim portion 44a ~~which that~~ extends ~~in peripheral relationship with~~from the periphery of the applicator plate 44 towards the carrier plate 42. After the applicator plate 44 is mounted to the carrier plate 42, for example by being glued thereto, a hollow space 46 is formed by that rim portion 44a, as can be seen from Figure 4. ~~It is to be noted in~~ In this respect thatembodiment, the connection between the carrier plate 42 and the applicator plate 44 is sealed and in particular is air-tight.

~~The~~As seen in Figures 3 and 4, the side 44b of the applicator plate 44, which faces away

from the carrier plate 42, forms an applicator surface to which the flat material element to be applied, such as for example a label, is held during the application procedure. That applicator surface 44b is provided with a plurality of grooves 44c, which extend in mutually parallel relationship at equidistant spacing.

5        ~~Material weak~~Weak locations 44d are also provided in the applicator plate 44 in raster grid configuration at equidistant spacings in the spaces between two successive grooves 44c, or a groove 44c and the associated edge of the applicator plate 44. Those ~~material weak~~ locations 44d are formed by circular depressions, as can be seen from Figure 4. ~~At~~ As shown in more detail in Figure 5, at the side 44e which of the applicator plate 44 that faces towards the carrier plate 42  
10 ~~and at which reinforcing ribs (not identified in greater detail) for the applicator plate 44 are disposed the~~the applicator plate 44 is provided in a manner corresponding to the material weak locations 44d, with further material weak locations 44f, which are also circular depressions. The material weak locations 44d, 44f which are oriented in mutually coaxial relationship are separated by a thin material skin portion 44g, which extends in transverse relationship to their  
15 axial direction. The thin material skin portions 44g exclude a flow communication between the two material weak locations 44d, 44f which belong to each other, in particular after production of the applicator head 10 in the factory. In other words, the applicator head 10 or the applicator pad 40 which can be replaceably inserted into the applicator head 10 cannot initially be used after manufacture as there is no flow communication between the applicator surface 44b and the  
20 suction air source.

Depending on the respective wish of the user of the applicator head 10 according to the invention, however, one or more thin material skin portions 44g can be perforated by means of the perforating tool D shown in Figures 1, 2 and 4, as a consequence of the deformable material of the applicator plate 44, so that the material weak locations 44d, 44f form an outlet opening  
25 which is in communication with the suction air source by way of the hollow space 46 and the mounting frame 20 with the openings 22a. In that way it is possible to form operational applicator surfaces of any desired configuration, the shape and size of which depend on the shape and size of the flat material element to be applied. Figures 2 and 3 show examples of different applicator surfaces A1, A2, A3 which are all square but of different sizes. The applicator surface

A3 corresponds to the full applicator surface 44b afforded by the applicator plate 44. In other words, in the case of the applicator surface A3, all thin material skin portions 44g of the material weak locations 44d, 44f have to be perforated, whereas, in the case of the applicator surface A1, only about one third of the material weak locations 44d, 44f have to be perforated. It will be appreciated that it is also possible to produce other shapes, such as for example rectangles, rhombuses, and so forth by means of the raster arrangement of the material weak locations 44d, 44f.

The perforating tool D can ~~be formed by~~ include a handle portion ~~(not identified in greater detail)~~, at one end of which can be centrally mounted a perforating needle ~~(also not identified in greater detail)~~, D2, as can be seen from Figures 2 and 4. It will be appreciated, however, that it is also possible to use any other suitable tool for perforating the thin material skin portions 44g.

Figure 6 shows a second embodiment of the applicator plate 44'. This embodiment is of a predetermined material thickness ~~which that~~ makes it possible to ~~implement removal of~~ remove material in a plane parallel to the applicator surface 44b'. In that way, ~~as shown in Figure 6,~~ the applicator plate 44' can be provided with an applicator surface 44b' whose ~~size~~ thickness at least approximately corresponds to the size of the flat material element or label. The removal of material can be effected, for example, by a milling operation. In that respect, the thickness h of material ~~h~~ to be milled away can be ~~so selected that it reaches to~~ reach approximately the depth of the recesses 44d' as far as the thin material skin portion 44g'. That ensures that ~~then~~ no secondary air issues from the ~~material~~ weak locations 44d' ~~which that~~ are possibly opened in the milling operation.

~~The~~ Referring to Figures 1-6, the applicator head 10 ~~according to the invention is can be~~ produced by ~~firstly~~ first providing a mounting holder 20. At the same time, or ~~subsequently~~ after the applicator pad 40 is produced, the carrier plate 42 ~~being~~ is air-tightly joined to the applicator plate 44 by, for example, by an adhesive. All thin material skin portions 44g of the ~~material~~ weak locations 44d, 44f of the applicator pad 40 are ~~still closed in that situation~~ intact at this stage. Then, the applicator pad 40 is inserted into the guide projections 24d of the mounting holder 20 until a ~~locking device (not shown) locks the~~ applicator pad 40 is locked to the mounting holder

20 and/or the abutment 42a bears against the outside of the frame wall 24. Then, individual thin material skin portions 44g corresponding to the shape of the flat material element to be applied can be perforated by means of the perforating tool D, either at the factory at which the applicator head 10 is produced, or by the customer.

5        ~~Then~~Before or previously at this point, the applicator plate 44 or 44' can be machined by means of a milling tool ~~in such a way that~~. In one embodiment, a part of the applicator plate 44' projects in raised relationship, ~~then forming the applicator surface 44b'.~~

10        ~~In order to be able~~A plurality of alternate applicator pads 40 may be provided to apply different flat material elements with one and the same applicator head 10, it can further be provided that a plurality of applicator pads 40 belong to an applicator head 10. By virtue of the interchangeability of the applicator pad 40 with respect to the mounting holder ~~20~~20, it is then possible for applicator pads 40 involving applicator surfaces ~~which~~that are perforated in different ways, for example the applicator surfaces A1, A22, and A3, to be selectively mounted to the applicator head 10.

15        Although the foregoing describes the invention in terms of embodiments, the embodiments are not intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention, which is limited only by the plain meaning of the words as used in the appended claims.

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